

This question is answered, in general, in the affirmative, with some reservation as to the possible existence of varietal or subspecific differences in the case of the humpback, Megaptera, and the lesser piked whale, *Balaenoptera rostrata*, or *acutorostrata*, as our author, following Lacépède, prefers to call it. Furthermore, additional evidence is adduced in support of the identity of the North Pacific species with those of the North Atlantic. This conclusion is entirely confirmatory of the views of European naturalists, and Dr. True's remarks on the distribution of the various forms deserve to be read in connection with Dr. Guldberg's recent very interesting papers on the probable course of the annual migrations of several species around the circuit of the North Atlantic.

But Dr. True has given us other things besides a careful account of specific characters. He has given us, in the first place, a singularly interesting epitome of the early history of whaling in America, downwards from the mythical days of the Saga of Thorfinn. It will be news to the citizens of New York that, in the seventeenth and eighteenth centuries, there was a not

Norwegians, which seems to be rare on the other side of the Atlantic, but which in certain years has bulked very largely in the Finmark catch; lastly, the humpback, Megaptera. Besides these a sperm whale is caught every now and then, and the Icelanders still take an occasional Nordkaper, or Biscayan whale. Thus the "finner" industry furnishes not only a large number of individuals, but a great variety of species to the observation of the naturalist. Several curious points crop up in regard to the relative commercial value of the several forms. Thus, for instance, Rudolphi's whale, a species very similar to the common rorqual, long overlooked and afterwards considered very rare by naturalists, is now a most valuable element in the fishery, its whale-bone, though no bigger and longer than that of the common species, being worth, from its intrinsic quality, just about ten times as much.

Dr. True's photographs show us, with a wealth of illustration, Sibbald's whale, the common rorqual, the humpback, and the Nordkaper as they lie upon the beach. Many interesting points are excellently well shown—the distribution of colour, the curious pleat-

ings of the ventral skin, the contrast in form between the long, slender, lanky Sibbald's whale and the shorter, stouter body of the common species, the tubercles on the head of Megaptera, the huge flippers with their garniture of barnacles in the same species.

It is a common practice of American naturalists, and Dr. True is no exception, to deal somewhat harshly with received nomenclature in the quest after "priority." Rightly or wrongly, the common rorqual is invariably known to us as *B. musculus*, but that name is here transferred to what we call *B. sibbaldii*; the former is here designated *B. physalus*, L., and *B. biscayensis* figures as *B. glacialis*, Bonnatere. The work as a whole does not lend itself to epitomisation, and the foregoing brief account does not do justice to its scientific interest.

D. W. T.

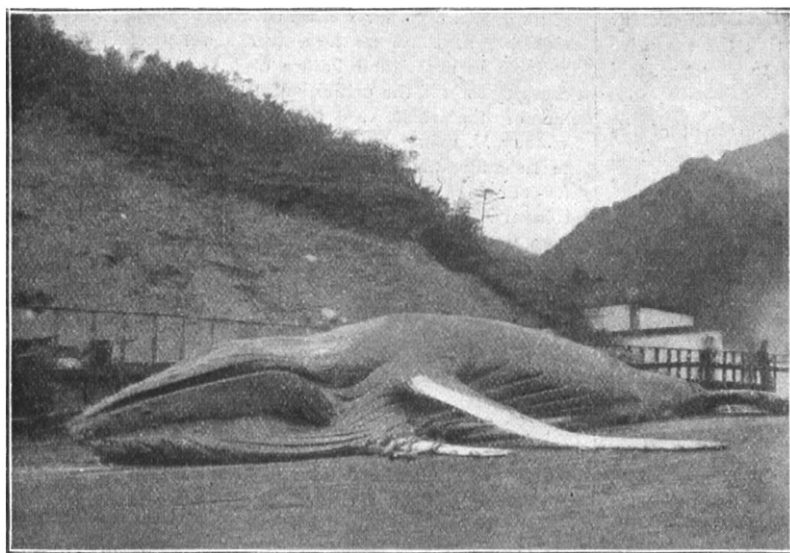


FIG. 2.—The Humpback, Balena Station, Newfoundland.

unimportant whale fishery on Long Island and in Delaware Bay, and that so late as 1823 (?) there was a family on Long Beach, N.J., who every winter sought for and "sometimes captured" whales, in which business they had been engaged, father and sons, ever since the Revolution. In the next place, and of still more popular interest, Dr. True has enriched his book with fifty large plates, for the most part taken directly from photographs, of whales as they lay on the beach at the Newfoundland factories. A few similar photographs have recently appeared from Norwegian and Scottish sources, but no such excellent and comprehensive series as Dr. True's has yet been made, though, by the way, one series of *B. musculus*, published about twenty years ago by M. Yves Delage, could scarcely be surpassed.

Five or six species of whales are obtained, more or less abundantly, at the various whaling stations. These are the great "sulphur-bottom," or Sibbald's rorqual, the blue whale of the Norwegians, which, rare on our own coasts, is the chief source of profit to the Icelandic and Newfoundland whalers; secondly, the common rorqual; thirdly, Rudolphi's rorqual, the Seiival of the

NOTES.

THE directors of the Ben Nevis Observatories, which were closed on October 1, have just issued a circular describing the circumstances in which these observatories have at last been discontinued. The maintenance of the two stations at Fort William and on the summit of Ben Nevis has involved an average yearly expenditure of 1000*l.* Of this sum, 350*l.* has been supplied by the Meteorological Council, and the remainder has been obtained from various private sources. It was hoped that the Treasury Committee which was appointed to consider the question of the annual grant to the Meteorological Council would deal adequately with the position of the Ben Nevis Observatories in its report, but in their circular the directors express disappointment that this was not done. The directors remark:—"Some of their number, including the two secretaries, were examined, and fully stated their case, besides handing in detailed memoranda regarding the history, work, and cost of maintenance of the observatories. Yet, with all this information before them, the committee state in their report that 'it appears that only 350*l.* per annum is required

to ensure the continued maintenance of the observatories.' The directors lost no time in calling the attention of the First Lord of the Treasury to this 'inexplicably erroneous' statement, and in appealing to him that means should be found to prevent the abandonment of the observatories. The Treasury, however, could not see its way to any further increase of the contribution from the Parliamentary Grant, but offered to continue the allowance of 350*l.* a year hitherto received from the Meteorological Council. As this arrangement would have left the directors exactly where they were before, face to face with the impossibility of continuing to raise 650*l.* every year, and with the obvious hopelessness of obtaining adequate pecuniary support from the Government, there was no alternative but to close the observatories."

It is announced in the *Times* that a donor, who desires to remain anonymous, has placed a sum of 1000*l.* in the hands of the treasurer of the Royal Society, to be devoted to the advancement of science. By his wish 500*l.* of this gift is to be placed to the credit of the "Catalogue of Scientific Papers Account" of the Royal Society, and the remainder to the credit of the "National Physical Laboratory Account" of that body, with the request that the executive committee of the laboratory will accede to any personal wish of the director as to its expenditure.

A STRONG, detailed indictment of the department of the War Office which should be responsible for the production of necessary maps appeared in Saturday's *Times* from the military correspondent of that journal. The war in the Far East has lasted now for nearly nine months, and not a single map of the seat of war has been issued by the Government department which is the chief recipient of the results of our geographical research. The vexatious thing is that the information, even the maps, exist, but that no endeavour has been made to utilise them for the public benefit. The Russian and Japanese Staff maps of Manchuria exist in London, but neither map can be purchased by the public through the trade, though, as both are in the hands of individuals in London, and whole sheets of the Japanese map have been reproduced by the Japanese Press, the presumption is that the mapping section of the director of military operations also stands possessed of them. A map intended to be of use to the public must be a compilation of these and other materials; but no such map has been issued officially at all. The only excuse for this deplorable want of sense is the lack of staff and of time to produce the map for which there is a public demand. In this case nothing could be simpler than to provide some house in the trade with the information available, and allow suitable maps to be produced by private enterprise. Our official maps are, the article affirms, nothing less than a national disgrace. Not only all the Great Powers, but even those of the second and third rank, are infinitely superior in cartography. These facts are then employed to direct attention to the whole question of the teaching of geography, and to warn us of a serious defect in our system of national education. We have suffered in the conduct of military operations because the teaching of geography has not assumed its proper place in the education of our army officers.

THE death is announced of Dr. Karl H. Huppert, emeritus professor of physiological chemistry in the University of Prague, at seventy-two years of age.

THE scientific committee of the Royal Horticultural Society met recently and received with regret the resignation of Prof. Henslow, who for more than a quarter of

a century has acted as its secretary. Mr. F. J. Chittenden, who has been for some time a member of the scientific committee of the society, has undertaken to discharge the duties of secretary until the end of the current session.

It is stated by the *Pioneer Mail* that the Burma Government has decided to discontinue the experiments for the improvement of the indigenous silk industry in the more important silk centres of the Province by the importation of silkworm eggs from France. Owing to climatic and other causes, rearing has failed with foreign imported eggs, and it is not considered worth while pursuing the experiments without the aid of an expert.

MR. J. N. HALBERT has been appointed assistant in the Dublin Museum in succession to Mr. G. H. Carpenter, who held the post for many years. Mr. Halbert is known as the author, in collaboration with the Rev. W. F. Johnson, of a list of the beetles of Ireland (*Proc. R. I. Acad.*). He has also published some papers in the *Zoologischer Anzeiger* and the *Annals and Magazine of Natural History*, on freshwater mites.

THE applications for space in the forthcoming automobile exhibition at Paris on December 4 far exceed the space available in the Grand Palace of Fine Arts, so it may be necessary to hold the exhibition at the Galerie des Machines. One of the curiosities of the exhibition will be the *Lebaudy II.* exhibited in a reduced model. To November 18 the Lebaudy dirigible balloon had executed not less than fifty-four ascents, and on the fifty-first the return to the Moisson Aërodrome, the starting point, was accomplished. From the last day of October to November 18 ten ascents were successfully executed.

THE first meeting of the annual session of the German Society of Naval Architects was held at the Technical High School at Charlottenburg on November 17. The Emperor William, the honorary president of the society, the Grand Duke of Oldenburg, the Secretary of State for the Imperial Navy, Admiral von Tirpitz, and the secretary of the British Institution of Naval Architects were present. Prof. Ahlborn, of Hamburg, read a paper on the spiral formation of water under the action of a ship's screw, and on the movements produced in the water by the revolution of the screw; and Prof. Braun, of Strassburg, dealt with the methods and aims of wireless telegraphy.

THE *Journal* of the Society of Arts states that among the congresses arranged in connection with the Liège International Exhibition of next year, and with which the co-operation of the Belgian Government is ensured, one on chemistry and pharmacy, convoked by the Belgian Chemical Society and the Liège Pharmaceutical Association, will be held at the end of July. The congress is to be divided into the following sections:—(1) general chemistry, physico-chemistry; (2) analytical chemistry, apparatus and instruments; (3) industrial mineral chemistry, including metallurgy; (4) industrial organic chemistry (sugar-boiling, fermentation, tanning, dyeing, &c.); (5) pharmaceutical chemistry; (6) the chemistry of food substances; (7) agricultural chemistry, manures; (8) biological and physiological chemistry (application to hygiene and bacteriology); (9) toxicology; (10) practical pharmacy; and (11) legislation and professional interests, deontology. The president of the organising committee is Prof. A. Gilkinet, of Liège.

A CONFERENCE on physical education was held on November 16 at the Education Offices of the London County Council, the Bishop of Bristol presiding. Miss Johnson, of the Swedish Institute, Clifton, advocated the organ-

isation of physical education on the lines of the Royal Central Institute of Sweden, which she described. Sir W. Church, president of the Royal College of Physicians, moved a resolution to the effect that it is desirable that a national system of physical education should be established in the United Kingdom. This was seconded by Sir Lauder Brunton, and supported by other speakers, including Lord Londonderry and Sir W. Broadbent. The *Times* of November 17, in a leading article on the subject of the conference, while acknowledging our supineness in this respect in the past, rightly deprecates any hasty action in the matter, and remarks that while Swedish and other systems have their merits, what we want here is not a system borrowed from Sweden, Denmark, or Japan, but a British system growing out of the British character, and suited, as no borrowed system can ever be, to British needs, and considers that we must begin with the children in our elementary schools.

In the *Times* of November 17 appeared a letter stating that skulls and limb-bones of horses of known pedigree, no matter what their breed, are required by the natural history branch of the British Museum, and the cooperation of horse-owners is invited in the endeavour to bring together a large series of such specimens. No mention is made in the letter of the special purpose for which a collection of this nature is required. Those who have kept abreast of zoological literature for the last year or two will, however, have scarcely failed to notice how much attention has been directed by naturalists to the problem of the origin of the various breeds of domesticated horses, and especially to the idea that thoroughbreds and Arabs have a different parentage from the "cold-blooded" horses of western Europe. The circumstance that some horses of eastern origin show a vestige of the cavity for the "tear-gland" of the hipparions has been recently brought to notice as an important factor in the problem. To ascertain the frequency of this feature is probably one of the objects of making the collection, while a second may be to ascertain the constancy of certain proportionate relations between the limb-bones of racers and cart-horses. The museum already possesses the skeleton of "Stockwell," from whom are descended most of our best thoroughbreds, and likewise the skull of "Bend Or," presented by the Duke of Westminster, and Mr. W. S. Blunt has promised a skull of one of his famous Arabs.

WE have received from Messrs. Friedlander, Berlin, a catalogue of books on comparative anatomy, which is divided into three sections, the first dealing with vertebrates and the second with invertebrates, while the third is devoted to comparative embryology and morphology.

No. 9 of vol. xxxi. of the *Proceedings* of the Boston Natural History Society is devoted to the North American parasitic funguses of the group *Ustilaginæ*. These organisms, which have been hitherto very imperfectly known, infest various parts of herbaceous flowering plants, and are represented by twenty-four genera included in two families. Much still remains to be done in determining their distribution, and some of the hosts of certain species are given on the authority of observers other than the author of this paper, Mr. G. P. Clinton.

AN account of the method of preparing *clayed* cocoa appears in the *Bulletin* of the Trinidad Botanical Department for July. The cocoa-beans, after being fermented and dried, are collected in heaps, upon which men are set to dance, while others replace the beans as they scatter. Meantime the heaps are dusted over with powdered clay

which adheres to the gummy surface of the beans and acts as a polish, so that finally the beans assume the appearance and colour of polished mahogany; careful drying completes the process, which results in the beans carrying and keeping better on account of the protective covering formed.

THE Cosmo Melvill herbarium, now the property of Owens College, Manchester, is estimated by the donor to contain five thousand genera, or two-thirds of the total number recorded in the "Genera Plantarum," exclusive of others since instituted, and the phanerogams alone amount to 36,000 different species. From a geographical point of view nearly every country appears to have furnished a quota. Amongst the more important collections mention should be made of Sir Joseph Hooker and Dr. Thomson's Indian plants, Dr. Henry's Chinese collections, Mr. C. G. Pringle's Mexican plants, and the specimens collected by Dr. Nuttall in North America.

THE Deutsche Seewarte has added another to its many useful publications, *Tabellarische Reiseberichte*, a collection of tabular reports of the meteorological logs received during the year 1903 from observers on ships. It has several times been suggested that observations made at sea should be published in a tabular form, similarly to those made at land stations; the late Admiral Makaroff was the last to urge the importance of doing so, but the question of expense has always stood in the way. The work in question does not attempt such a regular tabulation of observations, but gives a useful summary of some of the principal phenomena recorded on each voyage, e.g. the limits of the trade winds and monsoons, the force of wind, the storms experienced and the behaviour of the barometer during their occurrence, noteworthy currents, sudden changes of sea temperature, &c. Each report also gives the length and nature of the voyage, so that any person interested in the meteorology of any particular part of the ocean can determine approximately the amount of materials available. It is proposed to issue a similar volume for each year.

DR. H. HERGESELL, president of the International Aeronautical Committee, has contributed to *Beiträge zur Physik der freien Atmosphäre* an interesting account of his kite observations on the Lake of Constance. The ascents were first made in the year 1900, and subsequently in the years 1902 and 1903, on both occasions with the assistance of Count Zeppelin, who lent his motor-boat for the purpose. It is understood that such observations are somewhat difficult at an inland station, as the wind velocity necessary for raising the kite (about 8 metres per second, or 18 miles per hour) is not always available without the artificial wind produced by the motion of a boat. Dr. Hergesell's experiments clearly show that, frequently, inversions of temperature and humidity occur at certain levels, which are not exhibited by observations made on mountain peaks, and the opinion is expressed both by Prof. Mascart (president of the International Meteorological Committee) and by himself that however useful in various ways, observations on mountain stations have not led to the results that were expected from them. He is of opinion that if any improvement is to be made in what he terms the present stagnant condition of meteorological science, it will be by the investigation of the upper strata of free air rather than by piling up observations made at ordinary meteorological stations—in other words, by making meteorology a study of the physics of the atmosphere.

IN a communication to the Institution of Mechanical Engineers Mr. R. M. Neilson discusses the possibilities of gas turbines from a scientific standpoint, a region of

study to which up to the present little systematic attention has been given. The author considers that there are four different cycles which could be applied with advantage to a gas turbine, giving efficiencies of from 0.25 to 0.84, and two of them admitting of several different cases. The necessity of keeping the temperature of the blades of the turbine down to about 700° C. to a certain extent limits the efficiency, but, as the author points out, a decrease in the temperature of the source in a Carnot's cycle affects the efficiency less than an increase in the temperature of the refrigerator of the same amount.

We have received from the Stanley Electric Manufacturing Co., of Pittsfield, Mass., an interesting wall map showing the long distance power transmission lines in California. There are six power houses situated on the western slopes of Sierra Nevada from which power is transmitted electrically to San Francisco and the surrounding district. The longest transmission is from the De Sabla power house to Sansaulito, which is to the north of San Francisco, on the opposite side of the Golden Gate; the length of this line is 232 miles. More than 10,000 h.p. is being supplied to San Francisco itself from the electric power house which is 147 miles away. An additional power house is proposed, and also several additional lines.

At a recent meeting of the Faraday Society, among other papers was one by Miss B. Pool on a suggested new source of aluminium. This consists of the vast deposits of laterite which occur in several parts of India; these laterites are closely analogous to bauxite, from which aluminium is at present manufactured. The paper gives analyses of several of the laterites in different districts, and the author concludes that this raw material, on account of its purity, ready accessibility, and association with flowing water should be almost an ideal source of aluminium. Mr. W. M. Morrison, in the discussion, questioned whether it was probable that the Indian laterites would be used in this country, as the supply of bauxite near at hand was plentiful, though it was not unlikely that at some future date they might be worked *in situ*.

We have received from Messrs. Christy and Co., of Old Swan Lane, Lower Thames Street, E.C., a few samples of the several varieties of Dr. Schleussner's dry plates, and have found them to vindicate, practically, the commendations bestowed upon them by many Continental men of science, including several well known astronomers. The "ordinary" plates are characterised by their great sensitiveness and the evenness of their emulsion. The "special rapid" plates, intended chiefly for stellar photography and general scientific work, were found excellent, especially in stellar work, even faint stars giving fairly dense trails when the plates were exposed in a stationary camera. The results in this direction especially are enhanced by the very smooth grain of the finished negative. On testing the "orthochromatic" plates in terrestrial and stellar spectroscopic work they were found to be extremely sensitive, and, with relatively short exposures, gave spectra extending well up into the orange with only a short break on the less refrangible side of the "F" line. The "Viridin" are especially sensitive in the green, with reduced sensitiveness in the blue and violet, and should be found very useful in landscape work where the use of a screen is inconvenient or likely to lengthen the exposure unduly. All the plates were easy to develop with normal pyro-soda, and gave excellent, fine-grained negatives free from any trace of fog. Messrs. Christy are the sole agents for these plates in Great Britain.

NO. 1830, VOL. 71]

No. 9 of vol. cvi. of the *Bulletin de la Société d'Encouragement* contains several papers of metallurgical interest. M. H. Le Chatelier describes a photographic method of recording the temperature of pieces of steel at every instant during the rapid cooling which accompanies hardening, and investigates the law of this cooling in the case of the commoner baths, such as water, oil and mercury, which are employed in industry. Contrary to the usually accepted view, the rate of cooling by means of mercury is much smaller than that due to water; the specific heat of the quenching material, and not its thermal conductivity, is obviously the principal factor to be considered in such cases. The cooling by oil is relatively very slow, owing to its low specific heat and to its viscosity, which prevents loss of heat by convection. M. L. Guillet describes in the same part the properties of tin and titanium steels, and M. P. Mahler discusses the reversible actions occurring in the blast-furnace.

We have received a copy of the "British Standard Specification and Sections for Bull Headed Railway Rails," issued by the Engineering Standards Committee. It has been resolved that the steel used in these rails shall be of the best quality, the constituents conforming to the following limits:—carbon from 0.35 to 0.5 per cent., manganese from 0.7 to 1.0 per cent., silicon not to exceed 0.1 per cent., phosphorus 0.075 per cent., and sulphur 0.08 per cent. The manufacturer shall make and furnish to the purchaser a carbon determination of each cast, and a complete chemical analysis representing the average of the other elements present shall be given for each rolling. A table of the general dimensions of the "B. S." rails is given, with illustrative sections. For straight lines, the committee recommends the adoption of the following as the normal lengths of the rails, namely, 30 feet, 36 feet, 45 feet, and 60 feet. The tensile strength must not be less than 38 tons per square inch nor more than 45 tons per square inch, and a 5-foot length of rail shall respond satisfactorily to the blows of a falling weight of 2240 lb. The inspection and testing of the rails by the purchaser during the course of their manufacture are suitably provided for.

An interesting paper by Mr. L. Gilchrist on the electrolysis of acid solutions of aniline appears in the November number of the *Journal of Physical Chemistry*. On electrolysis a hydrochloric acid solution, aniline black is formed, the depolarising effect amounting to about 0.3 volt. Substituted chloranilines are not formed to any appreciable extent. Electrolysis of a hydrobromic acid solution, which has a considerably smaller decomposition voltage, leads on the other hand to bromanilines, and no aniline black is produced.

THE *Proceedings* of the Royal Dublin Society (vol. x., No. 23) contain a report by Dr. E. J. McWeeney on the cases of carbon monoxide asphyxiation which have occurred in Dublin since the addition of carburetted water gas to the ordinary coal gas. It appears that from 1880 to 1900, before the addition of carburetted water gas was practised, there was no recorded case of death from coal gas poisoning, whilst during the four years that have elapsed since the addition was made, there have been ten cases with seven deaths due to that cause.

In a paper published in the *Manchester Memoirs* (vol. xlix., 1904) Mr. W. Thomson describes experiments which show that arsenic is rapidly eliminated from the system by kidney secretion. After the administration of one-fiftieth of a gram of arsenious oxide, about 16 per cent. was found

to be eliminated in this way within twenty-four hours. The amount of arsenic in the secretions of people in towns where large metallurgical operations are carried on is found in some cases to be as high as one-thirtieth of a grain per gallon.

A SECOND edition of Prof. Hantzsch's "Grundriss der Stereochemie" has just been published by J. A. Barth in Leipzig. The rapid advances which have taken place in this branch of chemistry during the last ten years have rendered considerable additions necessary. Sections are now included dealing with the stereochemistry of diazo-compounds and complex inorganic bodies, and with the molecular asymmetry of nitrogen, sulphur, selenium, and tin compounds. The connection between configuration and biological activity, the reciprocal transformation of optical antipodes, and the phenomenon of steric hindrance are also treated in the new edition, which should be welcomed by all classes of chemists.

A THIRD edition of the "Elements of the Mathematical Theory of Electricity and Magnetism," by Prof. J. J. Thomson, F.R.S., has been published by the Cambridge University Press. A new chapter on the properties of moving electrified bodies has been added, and other minor changes have been made.

MESSRS. BELL AND SONS have published separately, under the title "Examples in Algebra," a selection of the examples in the recently published "Elementary Algebra," by Messrs. W. M. Baker and A. A. Bourne. The price is 3s., and the new volume may also be had in two parts at 2s. each.

THE yearly volume for 1904 of the *Reliquary and Illustrated Archaeologist* has now been published. The four separate issues, which have been referred to from time to time in these columns, together form a handsome volume. Some articles in the volume will appeal to students of science who are not archaeologists. Among these may be mentioned a well illustrated article by Mr. W. H. Legge "About Almanacs," and Mr. F. W. Galpin's "Notes on a Roman Hydraulus."

IN order to meet the requirements of the new syllabus in chemistry of the matriculation examination of the University of London, Dr. G. H. Bailey has taken advantage of the demand for a second edition of his book on chemistry to rewrite and enlarge it. In its present form "The New Matriculation Chemistry" contains everything that a candidate at the matriculation examination is likely to require. An introductory course of experimental work has been inserted in addition to other new matter. The volume is published by Mr. W. B. Clive, and edited by Dr. William Briggs.

OUR ASTRONOMICAL COLUMN.

ENCKE'S COMET (1904 b).—On a photograph obtained on October 28 with two hours' exposure, using the Bruce telescope, Prof. Max Wolf discovered a faint image of Encke's comet, the apparent position of which at 28d. 7h. 13m. 48s. (Konigstuhl M.T.) was

$$\alpha = 23\text{h. } 37\text{m. } 51.4\text{s.}, \delta = +26^\circ 0' 38''.0.$$

A faint tail, extending in a northerly direction, was suspected.

On the same night Prof. Millosevich at Rome was able to find the comet with the 39 cm. equatorial of the Roman College Observatory. The object was extremely faint, and had the following position at 6h. 30m. (October 28, Rome M.T.), $\alpha = 23\text{h. } 37\text{m. } 58\text{s.}, \delta = +26^\circ 1'.4$.

Prof. E. Hartwig also observed the comet visually, using the large refractor of the Bamberg Observatory, at

9h. 18m. 11s. (Bamberg M.T.) on October 30, and determined the following as its position:—

$$\alpha \text{ (app.)} = 23\text{h. } 28\text{m. } 1.0\text{s.}, \delta \text{ (app.)} = +25^\circ 23' 25''.1.$$

The comet was very diffuse with a faint central condensation, and a diameter of more than 10' (*Astronomische Nachrichten*, No. 3977).

OBSERVATIONS OF PERSEIDS.—The results of a large number of independent observations of the Perseid shower of last August, together with a detailed exposition by M. Chrétien of the process by which the positions of meteor radiants may be determined from the observed data by the method of least squares, are published in the November number of the *Bulletin de la Société astronomique de France*.

Among other results, those obtained by M. Perrotin at Nice and by M. G. A. Quignon at Mons are given. The former have already been summarised in these columns; the latter are as follows:—

During a total watch of 7h. 15m. between August 7 and 12, M. Quignon observed 110 meteors, chiefly Perseids, and determined the position R.A. = 44° , dec. = $+59^\circ$, as the mean radiant point of the shower. The maximum display took place between 22h. 40m. and 23h. 10m. on August 11, when 21 meteors, or 42 per hour, were seen.

HEIGHTS OF METEORS.—In a letter to the November number of the *Observatory* Mr. Denning publishes some data regarding the observed heights of the appearances and disappearances of several different classes of meteors.

He states that, generally speaking, the swift meteors become visible at a greater height than the slower ones, and do not approach so near to the earth's surface before disappearing. Thus for the Leonids and Perseids, both of which are characterised by their comparative swiftness, it has been determined that the former are generally more lofty than the latter, the average heights being as follows:—

	Height at beginning	Height at ending	No. of meteors
Leonids ...	84 miles	56 miles	25
Perseids ...	80 "	54 "	40

On the other hand, the mean heights of the very slow meteors appear to average about 65 miles at the beginning to 38 miles at the end of their appearance. These, however, appear to form two distinct classes:—(1) those having very low radiants, extending from 64 miles to 48 miles; and (2) those having fairly high radiants, extending from 66 miles to 28 miles.

The swiftest meteors apparently become visible when nearly 20 miles higher than the very slow meteors, whilst those of the latter which have high radiants come 20 miles nearer the earth than those having very low radiants.

Seven Quadrantids and four Lyrids gave mean heights of 67 miles to 52 miles and 84 miles to 50 miles respectively.

THE PHOTOGRAPHIC SPECTRUM OF JUPITER.—Using the large refractor of the Meudon Observatory in conjunction with a spectrograph containing one 60° prism and having a focal length of 292 mm., M. G. Millochau obtained a number of photographs of the spectrum of Jupiter during December and January.

A study of the resulting spectra, which were obtained on Lumière panchromatic plates and extend from F to C, showed a number of bands at $\lambda\lambda$ 618, 607, 600, 578, and 515, which are apparently the same as those observed by Keeler in the spectrum of Uranus. It further disclosed the facts that the water vapour and α bands were greatly strengthened in the planetary spectrum, and that all the bands were relatively more intense in that part which was produced by the light from the south equatorial band of the planet's apparent disc.

The appearance of the band at λ 618, which has been previously observed in the spectra of the superior planets, and of several new faint bands in the Jovian spectrum, indicates the existence of a gas in the atmospheres of the outer planets which does not exist at all, or only in much feeble proportions, in the atmospheres of the inferior planets.

M. Millochau intends to prosecute this research further at the Mont Blanc Observatory, where the clearer atmosphere should permit of better results being obtained (*Bulletin de la Société astronomique de France*, November).